a sample is disclosed. The system comprises a substrate disclosed herein and a device for detecting the barcoded pattern on the substrate.

[0017] According to an eighth aspect, a method for detecting a target and, in particular, a plurality of targets, in a sample is disclosed. The method comprises: contacting said sample with a substrate herein disclosed for a time and under conditions to allow binding of said target with said substrate; and detecting said target attached to the substrate.

[0018] According to a ninth aspect, a method to attach a molecule on a microfluidic support along a predetermined microfluidic pattern is disclosed. The method comprises: providing a mold comprising microfluidic channels, the microfluidic channels having an inlet and an outlet, the outlets of the channels configured to form part of the predetermined pattern, providing the support, said support suitable to be coupled with the mold, coupling the mold with the support, providing the molecule in the microfluidic channels for a time and under conditions to allow attachment of the molecule on the support; and decoupling the mold from the support.

[0019] According to a tenth aspect a system to attach a molecule on a microfluidic support along a predetermined microfluidic pattern is disclosed. The system comprises: a mold comprising microfluidic channels, the microfluidic channels having an inlet and an outlet, the outlets of the channels configured to form part of the predetermined pattern, and a support suitable to be coupled with the mold.

[0020] The methods and systems for attaching a molecule on a support on a microfluidic support along a predetermined microfluidic pattern can be used to manufacture an array and/or a substrate according to the present disclosure, in embodiments wherein the pattern is composed of substantially parallel lines forming a barcoded pattern.

[0021] Arrays, substrates, devices, methods and systems herein disclosed provide information in a one-dimensional fashion which can be detected with a single line scan (line profile) perpendicular to the strip direction to complete reading all information. In this way, is possible to obtain all the necessary information without need of a precise move of a reader (e.g. a scan head) which is instead required in imaging 2D array of the art. This feature can allow, in certain embodiments, the reading of barcode DNA array as easy as scanning the product barcode in supermarket.

[0022] Arrays, substrates, devices, methods and systems herein disclosed can provide an increased concentration of capture agents suitable to bind the target and, therefore, increased detection sensitivity (e.g. up to 0.1 picomolar) when compared to prior art techniques.

[0023] Arrays, substrates, devices, methods and systems herein disclosed can allow an increased number of locations for a specific capture agent on a surface (herein also indicated as spots). Accordingly, the arrays, devices methods and systems herein disclosed also allow detection of an increased number of targets or target related parameters (e.g. 50 targets or more) in comparison with the ones detectable with prior art techniques.

[0024] Arrays, substrates, devices, methods and systems herein disclosed are also compatible with microfluidic fabrication techniques, since the spots can be placed in positions that can be defined not only with respect to each other, but also with respect to microfluidic channels and/or other structure on the surface.

[0025] Arrays, substrates, devices, methods and systems herein disclosed allow providing high density capture agents on a substrate, with a decreased level of impurities in comparison to prior art techniques.

[0026] Arrays, substrates, devices, methods and systems herein disclosed also allow detection of a larger number of biomarkers in a reduced time (e.g. about 9 minutes) with respect prior art techniques, in particular in embodiments wherein the array is integrated with microfluidics.

[0027] Arrays, substrates, devices, methods and systems herein disclosed allow detection from a sample reduced in size (e.g. 500 nano liter per barcode and/or protein sections from only one cell) in comparison to the samples analyzed with prior art techniques, in particular in embodiments wherein the array is integrated with microfluidics

[0028] Additionally, since the arrays, substrates, devices, systems and methods herein disclosed allow detection of multiple biomarkers within the same environment, and in particular the same microfluidics environment, using a single assay technique, the relative error associated with measurements of different biomarkers from the same sample is minimized.

[0029] The arrays, substrates, devices, methods and systems herein disclosed are applicable to performance of the detection of various types of target molecules that can bind to immobilized capture agents. Suitable target molecules include, but are not limited to, proteins, peptide, polypeptide, ligands, metabolites, nucleic acid, polynucleotide, carbohydrate, amino acid, hormone, steroid, vitamin, drug, drug candidate, virus, bacteria, cells, microorganisms, fragments, portions, components, products, epitopes of virus, bacteria, microorganisms and/or cells, polysaccharides, lipids, lipopolysaccharides, glycoproteins, cell surface markers, receptors, immunoglobulins, albumin, hemoglobin, coagulation factors, volatile gas molecules, particles, metal ions and the antibodies to any of the above substrates.

[0030] The arrays, substrates, devices, methods and systems herein disclosed are applicable to performance of assays including diagnostic assays, environmental monitoring assays, heath/drug response monitoring assays and assays performed for research purposes. Exemplary assays that can be performed include but are not limited to detection of cancer biomarkers (e.g. prostate cancer antigen (PSA), and human chorionic gonadotropin (hCG)), detection of liver toxicity biomarker C-reactive protein (CRP) and plasminogen, detection of immuno complement proteins like C3, detection of cytokines such as interferon gamma (IFN-gamma), tumor necrosis factor alpha (TNF-a), interleukin 1 alpha (IL-1 alpha), interleukin 1 beta (IL-1 beta), transforming growth factor beta (TGF beta), interleukin 6 (IL-6), interleukin 10 (IL-10), interleukin 12 (IL-12), granulocyte macrophage colony stimulating factor (GM-CSF) etc, detection of chemokines: CCL2 (also called monocyte chemoattractive protein-1, MCP—1), and demonstration of detection of complementary DNA molecules.

[0031] Additional applications of the arrays, substrates, devices, methods and systems herein disclosed include but are not limited to use the patterning technique to make a barcode array of gas selective polymers as gas sensors; patterning liquid crystal film for LCD, and assemble magnetic particle array using DNA-iron oxide nanoparticle conjugates (just like the antibody-DNA conjugates) for magnetic barcodes (product ID).

[0032] The details of one or more embodiments of the disclosure are set forth in the accompanying drawings and the